

MANAGEMENT PRACTICES EXECUTED IN SCIENCE AND TECHNOLOGY PARKS (STPS)

GERARDO ANGULO-CUENTAS

Universidad del Magdalena / Santa Marta, Colombia
gerardoangulo@unimagdalena.edu.co

JAIME ALBERTO CAMACHO-PICO

Universidad Industrial de Santander / Bucaramanga, Colombia
jcamacho@uis.edu.co

MARYURIS CHARRIS-POLO

Universidad del Magdalena / Santa Marta, Colombia
mcharris@unimagdalena.edu.co

ABSTRACT

To describe and evaluate the effect of the management practices implemented in six factors, which, according to the identified literature, influence the performance of STPs. These factors are: Leadership, Strategy, Links with Universities, understanding and knowledge of the hosted company, the management of facilities, staff and organizational structure.

For the preliminary research of management practices, it was carried out a review of the literature related to STPs, (Angulo, et al., 2013). For each factor, it was pretended to identify the processes, practices and activities that could be developed on a park, according to the previously established criteria in the theoretical framework for each factor and were based on the processes reference framework, (Angulo et al., 2015).

The methodology was executed in two phases: the first one consisted in the preliminary identification of practices in the literature; and in the second phase it was consulted on a Delphi in three rounds for a group of directors of STPs.

The most important result of this chapter is the identification of a total of 39 practices, on which the respondents have reached a level of agreement of more than 70%, from their perception of the effect they have on the performance of the STP. In the low-effect category, there was an agreement for a total of 28 practices; for a total of three practices there was agreement among respondents for a moderate effect; and, with a high-performance effect, respondents agreed to eight practices.

The main limitations of this study were the number of cases considered, and the different levels of development of the STPs studied. Future studies should expand the number of parks surveyed and control variables such as the age of the STP or establish criteria to determine at what stage of development each STP is and a quantitative approach to compare the effects of each practice.

The identification and documentation of the 125 management practices analysed in this study serve as a reference for the authorities responsible for the development of science, technology and innovation, specifically, for policies to

promote STPs and other similar policy instruments. Including managers and promoters of new STPs or initiatives with similar objectives.

The present paper contributes to the literature on the management of STPs by testing the utility of the Delphi method in the identification and perceived valuation of the management practices executed in STPs. This work also makes a theoretical contribution through a literature review related to the processes and activities developed in STPs and taking advantage of the experience and knowledge of its directors and managers.

METHODOLOGICAL DESIGN

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IDENTIFICATION OF PRACTICES IN THE LITERATURE

For the preliminary research of management practices, it was carried out a review of the literature related to STPs, see (Angulo, et al., 2013). For each factor, it was pretended to identify the processes, practices and activities that could be developed on a park, according to the previously established criteria in the theoretical framework for each factor and were based on the processes reference framework (see Angulo et al., 2015b).

DELPHI QUERY

Consultation with STP managers was based on the Delphi three round method. The Delphi technique is in force in conducting studies related to the consultation of experts, in cases where it is not possible to physically reunite them. Graefe and Armstrong (2011) find experimentally that the Delphi method is in some respects so precise, and in other aspects superior, to the traditional face-to-face encounter. Klenk and Hickey (2011) says that the anonymous approach to Delphi mitigates problematic features of face-to-face group interactions such as: the fact that some individuals dominate the conversation, while less confident participants remain silent; that the group is polarized around a theme; or, that the group reaches hasty conclusions. For Landeta and Barrutia (2011), the classical conception of the Delphi method implies the following characteristics: it must be an iterative process, the anonymity of the participants must be maintained, the feedback is controlled and a statistical response of the group is obtained. It is an iterative process because the experts should be consulted at least twice so that they can reconsider their response with the help of the information they receive on the opinions of the other experts; The anonymity of the participants is maintained because the answers go directly to the coordination, this means that it is possible to develop the process with a group of experts that do not agree in time or space, and avoiding the negative influences that the individual answers can have, due to factors related to the personality of the participating experts; controlled feedback is that the exchange of information between experts is not free and is carried out through coordination, so that all

information that is not relevant is eliminated; a statistical response from the group implies that all opinions are part of the final answer and the questions are formulated so that a quantitative and statistical treatment of responses can be carried out.

For the collection of the information, the instruments were sent by e-mail and were answered by the managers or directors of the STPs, assuming that they knew the management processes executed in the park. Details of each of the elements involved in the Delphi query are described below.

Instruments

Questionnaires were constructed for each of the three rounds of the Delphi query. The questionnaires were written in English and Spanish using the Google Docs1 form creation tool. For the Spanishspeaking countries, the questionnaires were sent in Spanish, while for the other countries they were sent in English. Both in the invitation to participate, as in the reminders, the participants were guaranteed the confidentiality of their identity and the identity of the park with the aim of expressing themselves freely. For this reason, the results are shown mainly in an aggregated way and using ratings where a specific mention of the park is made.

Table 1: Number of participant parks per country and per round

Country	Participants			
	Invitations	1st round	2nd round	3rd round
Spain	14	6	6	6
United States	6	3	3	2
Brazil	6	1	1	-
South Korea	6	1	1	-
Sweden	6	1	1	-
United Kingdom	5	2	2	1
China	4	1	-	-
Italy	3	3	3	3
Malaysia	2	1	-	-
Canada	1	1	1	-
Netherlands	1	1	1	1
Venezuela	1	1	1	1
Other countries	28	-	-	-
Requests sent	83	47	47	47
Received responses	47	22	20	14
Response rate for invitations	56.60%	26.50%	24.10%	16.87%
Response rate for requests sent	56.60%	46.80%	42.60%	29.79%
Error margin for invitations (CL: 95%)	9.47%	18.02%	19.20%	24.03%
Error margin for requests sent (CL: 95%)	9.47%	15.4%	16.79%	22.18%

Agreement level among the participants

It is defined as a strict agreement when the scores given by all the respondents are in the same scoring region. A broad agreement is reached when at least 70% of respondents' scores are in the same scoring region. (Meshkat et al., 2014), (Von der Gracht, 2012).

In the present work, it is considered that the level of agreement of the participants and the margin of error present in each one of the rounds are interrelated. Regarding the level of agreement to declare that consensus exists among participants in a Delphi-based study, Von der Gracht, H. a. (2012) finds that it has been declared a consensus with minimum levels of agreement of 51% as well as a stricter one that establishes it with a minimum of 95%. Table 12 it can be observed that the error margin for the first round is 18% and for the second round is 19,2%. For this, it is established as a consensus, an agreement level of at least 70% of the participants. This is explained, in the worst case, when discounting the margin of error would obtain a level of agreement of at least 50.8%, which would be consistent with Loughlin and Moore, (1979).

Responding rate

As can be seen in Table 1, the response rate for the first and second rounds was 26.5% and 24.1%, respectively. Baruch and Holtom (2008) report that the average response rate in surveys requesting information on organizations is 35% (SD = 18.2%), and finding studies published in high-impact refereed journals with response rates of 10%. For the particular case where the information is requested via web, the average response rate is 38.9% (SD = 15.1%), and the minimum response rate reported in studies published by refereed high-impact journals was 10.8%. Due to the above it is considered that the response rate of the present study is acceptable.

Invitation to participate in the Delphi study

To select the directors that participated in this study, there were used the 409 STPs that were registered in WAINOVA'S INNOVATION ATLAS edited by the World Innovation Atlas (Wainova, 2009). The Atlas has solicited the STPs to report 18 fields: 1) Creation year, 2) Web address, 3) Postal address, 4) Contact person and position, 5) Phone number, 6) E-mail, 7) Number of resident business, 8) Number of incubated companies, 9) Number of graduated businesses, 10) Number of incubators 11) Workforce in the incubator, 12) Number of R&D centers, 13) Acceptance of other types of residents, 14) Total area, 15) Annual incomes, 16) Total of employees, 17) Type of space offer (e.g. Sale or lease, offices or land), and 18) Total of technology sector present. Taking as a reference the previous fields, it was decided to select those STPs that meet the two conditions that follows: First, that they had reported the General director, president or CEO and their email address as the contact person. As a second condition it was necessary that, within the 16 fields different to the person and contact mail, they had reported at least ten of them. The above in order to contact STPs with willingness to participate and availability of information. Thus, a total of 83 possible respondents were obtained (see Table 1).

The invitation to participate was made on March 1, 2012. Two reminders were held: March 8 and 12, 2012. It was defined as the deadline to accept responses on March 14, 2012, date until which 47 Positive acceptance responses to participate in the study were received (see Table 13). As can be seen in Table 1, the response rate was 56.6% for a margin of error of 9.47% (CL: 95%).

First round

In this round were invited to participate the 47 individuals who responded affirmatively to participate in the study. Each participant was given the list of practices identified in the literature and proposed by the author. In the same way, they were invited to propose some practices developed in their organization, to be included in the list of reference practices in the management of STPs (Cf. Meshkat et al., 2014). In this first round, we had a response rate of 46.80% if it is calculated on the applications sent and 26.50% if it is calculated on the invitations sent. On the basis of the invitations sent there would be a margin of error of 18.02% (CL: 95%), which would fall to 15.4% (CL: 95%) if it is calculated on the applications sent, which for this round correspond to the Individuals who confirmed their interest in participating in the study.

In the sent instrument, they were given a set of practices identified in the literature to determine whether they were executed or they weren't executed in their park. They were also asked to make proposals for practices that were being carried out in their park and that, in their opinion, had an influence on the performance of the park, based on the practices proposed in the instrument.

The result of this round was a list of practices executed in STPs. The first set of practices corresponds to those that according to respondents, are executed in at least one STP of the consulted. The second set of practices present in the list corresponds to those that were proposed by the respondents.

Second round

With the list of practices obtained in the first round it was proceeded to consult the 47 individuals who answered affirmatively the invitation to participate in the study. Each participant was asked to rate on a nine-point scale the effect that each practice would have on STP performance results.

On this scale, the 1-3 region corresponds to the qualification of those practices that would not have or would have a low effect on the STP performance results; The scores of 4-6 represent those practices that would have a moderate effect; While the scores of 7-9 represent those practices that to the consideration of the respondents, have a high effect on the results of a STP.

In this second round, we had a response rate of 42.60% if it is calculated on the applications sent and 24.10% if it is calculated on the invitations sent. On the basis of the invitations sent there would be a margin of error of 19.2% (CL: 95%), which would fall to 16.79% (CL: 95%) if calculated on the applications sent, which for this round correspond to the Individuals who confirmed their interest in participating in the study. Given the objectives of this thesis, those practices in which 70% of the respondents did not qualify them in the region with a high effect (7-9) were eliminated. The results of this round were sent back to the respondents to receive their feedback in the third round.

Third round

In this round, the respondents qualified again the practices using the same scale of the second round. However, on this occasion they were aware of the results of the second round, which highlight the items that were eliminated because they did not reach a minimum of 70% of qualifications in the high-effect region. With the information received, the respondents had the possibility to reconsider their qualifications, maintaining anonymity and thus respecting the positive characteristics of Delphi, described by Landeta and Barrutia (2011).

In this third round, it was had a response rate of 29.79% if it is calculated on the applications sent and 16.87% if it is calculated on the invitations sent. On the basis of the invitations sent there would be a margin of error of 24.03% (CL: 95%), which would fall to 22.18% (CL: 95%) if it is calculated on the applications sent, which for this round correspond to the Individuals who confirmed their interest in participating in the study. The result of this third round was a list of management practices implemented in STPs, grouped into the six factors studied and ranked according to the scores obtained in the Delphi rounds.

Table 2 summarizes the dates in which they were convocated and the reminders to participate that were done for each one of the rounds.

Table 2: Detail of the announcement dates and reminders of each one of the moments of the Delphi study

	Announcement	Reminder 1	Reminder 2	Reminder 3	Closing
Invitation	March 1st 2012	March 8th 2012	March 12th 2012	N/A	March 14th 2012
1st Round	March 15th 2012	March 29th 2012	April 12th 2012	April 26th 2012	May 10th 2012
2nd Round	May 24th 2012	June 7th 2012	June 21th 2012	July 5th 2012	July 19th 2012
3rd Round	August 2nd 2012	August 16th 2012	August 30th 2012	September 7th 2012	September 21st 2012

RESULTS

The results of this chapter are presented in two parts: the first one corresponds to the set of practices identified in the literature, organized according to the six factors already described. The second part of the results corresponds to the execution of the Delphi study and these are organized according to the order of execution of each one of the rounds.

Practices identified in the literature

For the preliminary identification of management practices, it was done a literature review related to STPs see (Angulo, et al., 2013). For each of the factors, it was sought to identify the processes, practices or activities that could be developed in a park according to the criteria previously set in the theoretical framework for each factor and that were based on process frames of reference. The following are the practices identified in the literature, grouped according to the factors Leadership, Strategy, Links with Universities, understanding and

knowledge of the hosted company, facilities management, and staff and organizational structure.

Proposed practices in Leadership factor

This item aimed to identify specifically the practices related to how STP leaders are chosen and formed and how they exercise their leadership. In the first instance is Fukugawa (2006) that highlights the characteristics of the director within the many factors that could affect the variation in the performance of the parks. For Wessner (2009) well-trained managers facilitate networking among researchers, entrepreneurs, investors, and other key players in the park-related innovation ecosystem. On the other hand, Lindelöf and Löfsten (2002) argue that the diverse objectives of the STPs are reflected in the professional curriculum of its directors. According to these authors, the directors have been recruited directly from industry or government agencies and universities, with profiles ranging from marketing, management, finance, research and technology. However, they find that few STP managers have a strong curriculum in finance and accounting. Ratinho and Henriques (2010) point out that given their perspective from professional practice as directors, they say that it is necessary for a director to combine the profiles of a scientist, a politician, and a businessman. These multiple profiles would allow a director to communicate effectively with the different players in the territorial innovation system where the park is located. On the same line there are Bigliardi et al. (2006, p. 491), finding that in the recent and common versions of parks, its directors play a pivotal role in reconciling the expectations of stakeholders, which differ according to the great diversity of missions to the organization from where they come from or to which they represent, since at least in the European context, the birth of parks is usually favored by local governments, universities, professional associations, chambers of commerce, or banks, among others. For these authors it is clear that these actors have different expectations, so the park manager must mediate with them and prioritize them in a way that can work in coordination with all of them, that is, acting as an interface and face the particular demands of the most influential stakeholders in the park. As a result of this complex process of conciliation, the true mission of the park will emerge and the strategies derived from it. In their own research (Angulo, Camacho, and Jaime, 2012), they also find important the role of the leader of the park initiative in front of the conciliation of the parts involved in it. Three territorial government agencies (one regional and two local), two universities (one public and one private) and two private companies are formally linked in the analyzed park.

Within the expectations to conciliate, that the leader of this park has faced are highlighted: 1) the urge of territorial government entities to obtain immediate results in terms of employment and wealth generation, b) technological sectors of interest, 3) Regional projection of the park versus an initiative of institutions, 4) control and management of the park.

Based on the above aspects discussed in the literature, the following set of benchmark practices could be proposed with respect to the director's home sector: PPL1: the park manager is chosen because he has previous experience in

management positions in industry. PPL2: The park director is chosen because he/she has previous experience in management positions in the public/government sector. PPL3: The park director is chosen for having previous experience in management positions in universities. As an alternative that represents those decisions of selection of directors that are not charged to any of the three practices previously stated, it is proposed: PPL4: the director of the park is chosen for having previous experience balanced in managerial positions in industry, public sector/Government and universities.

Regarding the professional formation of the directors, a family of practices could be proposed with the following generic structure: PPL5: the director of the park is chosen for having higher education training in specific areas. In the consultation of the directors interviewed, the areas proposed by Lindelöf and Löfsten (2002) were considered: marketing, management, finance, research, technology management, accounting and commercial management (sales). According to the above, this family would consist of seven practices.

The directors' curriculum would also include professional experience in certain areas. In view of this, the following practice is proposed: PPL6: the park director is chosen for having professional experience in specific areas. In order to propose the practices in this sense, the same ones used for higher education were taken into account, which come from Lindelöf and Löfsten (2002). This family of practice would also have seven elements.

Analyzing the STPs of Italy, Colombo and Delmastro (2002), they wonder if there is a successful model for these organizations; within the studied diversity, they consider that one of the aspects to be studied in the evaluation of successful park models, is the one concerning the presence of a dedicated director.

According to Siegel, et al. (2003), there are three types of agreement for the administration of a park to which its stakeholders come: the first is not having someone dedicated to management and sharing the administration tasks between stakeholders.

The second type of agreement consists of a single person dedicated to the administration of the park, it would develop an expertise in the specific needs of the installed firms and for this purpose their training and experience would be important, especially the balance of technical, financial and marketing skills. The third type of agreement for the management of a park would consist of a group of people physically located on the park site, which would imply a formally integrated management structure that would provide a basis for long-term development. Westhead and Batstone (1999) find that the proactive role of management in parks that have a full-time director (Westhead and Storey, 1994) is generally positive for firms located in them. For Siegel, et al. (2003), a full-time director can: a) legitimize entrepreneurship activities and increase their commercial, professional and social networks; B) reduce the uncertainty and fixed costs for the owners of the hosted firms; (C) improve the reputation of newly established companies with limited social and business networks and thus attracting additional capital and better employees; D) promote the transfer of technology through the promotion of the links between institutions of higher

education -HEIs- local and hosted firms; E) develop an environment that generates confidence between hosted firms, local HEIs and other firms outside the park. Löfsten and Lindelöf (2005) also ask if the differences in innovation production of firms located in parks may be due to the activities developed by the directors of these entities. Given the above arguments, it is proposed as a possible benchmark practice: PPL7: The park has a dedicated full-time manager to manage it.

The parks that have been successful have usually had a committed driver with long-term vision, and this is evident in Senator Bingaman's role in the growth of the 'Sandia Science and Technology Park' in New Mexico (USA) (Wessner, 2009, pp. 36-37). For Link and Scott (2003) the leadership led by Archie Davis in Research Triangle Park is also important, whose vision and energies have influenced the growth of the park for more than 30 years. This situation is also corroborated in the Colombian case, specifically in the Guatiguará Technological Park, whose growth in the period was made possible by the continuity of the management team of the park and the manager university (Angulo, Camacho, and Jaime, 2012). For the above reasons, it is posited as a possible reference practice the continuity of the director, more specifically it is proposed: PPL8: The director of the STP is chosen for periods of five years or more.

On the other hand, Link and Scott (2003) affirm that the contemporary approaches recognize the entrepreneur as an independent production factor as important as they are the land, the work and the capital. Supported on this argumentation line and based on the documentation of outstanding technology parks, it is preliminarily concluded that most of the most successful STPs have been benefited from the entrepreneurial nature of their director. Due to the above, the practice associated with leadership PPL9 is proposed: the park director is chosen for having experience in entrepreneurship.

Table 3 summarizes the practices proposed based on the literature, in which is referred to leadership factor.

Table 3: Practices proposed in leadership factor based on the literature

ID.	Proposed practices
PPL1	The park director is chosen because he has previous experience in management positions in the industry.
PPL2	The park director is chosen for having previous experience in management positions in the public / government sector.
PPL3	The director of the park is chosen for having previous experience in management positions in universities.
PPL4	The director of the park is chosen for having previous balanced experience in management positions in industry, public sector/government and universities.
PPL5	The director of the park is chosen for having higher education training in specific areas.
PPL5.1	The director of the park is chosen for having higher education training in marketing.
PPL5.2	The director of the park is chosen for having higher education training in management.
PPL5.3	The director of the park is chosen for having higher education training in finance.
PPL5.4	The director of the park is chosen for having higher education training in investigation.
PPL5.5	The director of the park is chosen for having higher education training in technology management.
PPL5.6	The director of the park is chosen for having higher education training in accounting.
PPL5.7	The director of the park is chosen for having higher education training in commercial management (sales).
PPL6	The park director is chosen for having professional experience in specific areas.
PPL6.1	The park director is chosen for having professional experience in marketing.
PPL6.2	The park director is chosen for having professional experience in management.

PPL6.3	The park director is chosen for having professional experience in finance.
PPL6.4	The park director is chosen for having professional experience in investigation.
PPL6.5	The park director is chosen for having professional experience in technology management.
PPL6.6	The park director is chosen for having professional experience in accounting.
PPL6.7	The park director is chosen for having professional experience in commercial management (sales).
PPL7	The park has a dedicated full-time manager to manage it.
PPL8	The STP director is chosen for periods of five years or more.
PPL9	The director of the park is chosen for having experience in entrepreneurship.

Proposed practices for the strategy factor

This section documents the criteria considered for the identification of practices in relation to the strategy factor. The initial criteria addressed practices related to the identification of stakeholder needs and internal capabilities; as well as practices related to the development, implementation and sustainability of the strategy. Next, the identified practices and the elements of the literature that allow their identification are presented.

Bigliardi et al. (2006) based on the fact that the real strategy of the park determines its performance, analyze in the literature, the factors that determine the mission and the consequent strategy that a STP adopts. The factors they identify correspond to: the conditions of the context in which the parks operate, the interests of the parties involved and the life cycle of the park. By analyzing empirically these conditions in four Italian parks, they partially check their assumptions and add a new determinant element of the strategy: the form of legal constitution of the park.

For the nature of the founding and sponsoring institutions, Colombo and Delmastro (2002) affirm that European parks are often established by an alliance between national and local governments, private companies and universities with the intention of replicating the successes of previous experiences in the USA. Siegel, et al. (2003), identifies three types of strategies for the creation of a park in the United Kingdom: The first and less common is a park founded and managed by a university. The second consists of an alliance between a university or HEIs and private investors; under this approach a different legal entity is constituted to manage the park. The third strategy is the most common and consists of an alliance between several partners working together within a flexible and informal framework; under this approach there is limited involvement of the university and its academics in the operations of the park management unit.

Considering the previous aspects related to the creation strategy of the park, the following practices are proposed: PPE1: The park was created by a very small number of founders (maximum two). As an alternative practice PPE2 was proposed: the park was created by a broad base of founders (more than two).

Also, when creating a park it is defined the strategy agreed by the founders for their administration. According to Siegel et. Al (2003), in the United Kingdom, parks operate under three forms of management strategy. The first is a flexible and informal team, the founding entities divide the management tasks among them and there is no physical presence, nor full time dedication of any official in

the facilities of the park. The second form consists of a single person dedicated to the administration of the park and located in the facility, as described in the section of leadership practices. The third type of management strategy consists of the formation of a separate or independent legal entity as a management unit and that is located in the park facilities. This implies a management structure and staff that can provide a basis for the long-term development of the STP. On the basis of the above considerations, the following alternative practices were proposed, PPE3: At the time of creating the park, a separate and autonomous legal entity of the founders was also created to deal with its administration; And PPE4: At the time of creating the park, through an informal and flexible agreement, the founders distributed the tasks of their administration, not having a dedicated full-time person for these activities.

Another strategic decision that is taken at the time of the creation of the park has to do with the type of residents that will be received (Colombo and Delmastro, 2002, p.1128). There are parks that have restrictive policies to receive residents (Hansson et al., 2005, p.1143), (Yang et al., 2009, page 78), (Bakouros et al., 2002, p.125) Other parks have open policies for selecting residents, oriented towards a greater diversity of enterprises (Bakouros et al., 2002, p. 125) or with the objective of maintaining rent income (Lindelöf and Löfsten, 2002, p. 148).

The policies of admission of residents have their criteria fundamentally oriented by the level or technological sector of the aspiring companies. For example, in order to obtain support at the Symbion Scientific Park (the first one created in Denmark), a number of criteria must be fulfilled, including the fact that the company is research-based or technology intensive, (That is, there should be no direct or indirect competitors at the international level) and that their products could be patented (Hansson et al., 2005, p.1043). There is also the case that restrictive policies obey the orientation of specific sectors of the industry. For Taiwanese government (where space in STPs is very limited) it has become a critical issue to select the companies to enter them and has opted for receiving those that have a greater growth potential and belong to certain sectors of high Technology (computing, semiconductors, communications, photoelectronics, precision equipment and biotechnology). By 2006, Taiwan's government and private sector had spent most of their resources in the computer and semiconductor sectors for two decades (Chen et al., 2006, p.463). A specific case of a strict tenant admission policy is found in the statute of the Hsinchu Science and Industrial Park (Yang et al., 2009, p.78); According to this, in order for an industry to be accepted in the park, at least one of the following criteria must be met: (1) To have diverse capacities in product development and manufacturing, and to have an integral plan for product development. (2) Their products must have potential for development and innovation. (3) Being R & D intensive, or helping to introduce or train advanced scientists and technicians during the manufacturing process. (4) Be represented by a well-established research institute that is focused on R & D & I. Based on the above considerations, the following four practices were proposed: PPE5: At the time the park was created, strict criteria were defined to admit tenants. As an alternative practice, PPE6: At

the time of creating the park, strict criteria were not defined to admit renters, and any type of business can be admitted to the park. Starting from the admission criteria based on the industrial or technological sectors to which the firms applying for admission to a park belong, the following practices are proposed: PPE7: The park admits residents belonging to a small number of industrial or technological sectors. As an alternative practice PPE8 is proposed: The Park admits residents belonging to a broad (many) industrial or technological sector.

Table 4: summarizes the proposed practices based on the literature, in which is referred to strategy factor

ID.	Proposed practices
PPE1	The park was created by a very reduced base of founders (maximum two)
PPE2	The park was created by a wide base of founders (more than two).
PPE3	At the time of creating the park, a separate and autonomous legal entity of the founders was also created to take care of its administration.
PPE4	At the time of creating the park, through an informal and flexible agreement, the founders shared the tasks of its administration, without a person dedicated full-time to these activities.
PPE5	At the time of creating the park, strict criteria were defined for tenants' admission
PPE6	At the time of creating the park, there were not defined strict criteria to admit tenants, any type of business can be admitted in the park.
PPE7	The park admits residents belonging to a reduced base (few) of industrial or technological sectors
PPE8	The park admits residents belonging to a broad (many) industrial or technological sectors.

Proposed practices in the management of the links with universities

In relation to the management of links with universities, specifically those practices related to assuring the participation and support of the Universities in the fulfillment of the mission of the park, would be the ones to be explored.

The link between universities and new technology-based enterprises is a key element in the concept of STPs (Löfsten and Lindelöf, 2002, p.870). Most empirical studies confirm that STPs favor the links of established firms with local universities. In Sweden and the United Kingdom, STPs would favor informal links (e.g. personal contacts between entrepreneurs and academics or the exchange of specialized literature) with HEIs but no evidence has been found to favor formal links such as research contracts or Joint research (Löfsten and Lindelöf, 2002, p.871), (Vedovello, 1997, p.501). In contrast, Colombo and Delmastro (2002, p.1180) in Italy and Fukugawa (2006, p.393) in Japan find that STPs tend to favor formal links. Due to the above in this study will not emphasize the formality of the links, but in the practices, that favor the links independently of their formality. For Storey and Tether (1998), STPs conduct a management aimed at ensuring the transfer of technology and business skills between the firms in the park and local HEIs. These authors say that the reason for developing parks lies in the fact that they can play the following roles: a) allow academics from local universities to market their research in a convenient location; B) provide accommodation for well-established companies near or within the university

campus and thus facilitate research links with individuals or departments within the university; And c) provide accommodation to small businesses that are using and developing sophisticated technologies, with the aim of obtaining benefits from the proximity to the university and other similar companies located in the park, as well as receiving the services offered by the park staff. Based on the arguments described above, the following practices are proposed: PPV1: Establish incentives for the most productive scientists of the local university to be located in the park to commercialize their research.

McAdam and McAdam (2008) argue that a park can attract firms to be located in its facilities, incorporating mechanisms that promote partnerships between universities, installed firms and other parts, to facilitate the transfer of knowledge and expertise from universities to companies. For Lalkaka and Shaffer (1999) and Lalkaka (2001), the study of parks in Brazil and the experience in China, it is concluded that developing relations with universities and research institutes has brought positive effects on the local economy of the area of influence of the park. The link with universities provides one of the main sources of technology, expertise, graduate students, documentation and laboratory support. For the authors mentioned, these relations must be structured through formal agreements between universities and resident firms. It is clear that the links would be directly between the universities and the resident firms, so that the administration of the park fulfills its role in favoring and promoting these links. Based on the above arguments, it is proposed to analyze the role of the following proposed practices. PPV2: The park has at least one person dedicated to managing and promoting the links of tenant companies with universities. As a practice that would involve a more formal action of the park would have, PPV3: The park has a formal organizational structure dedicated to the management of the collaboration between tenant companies and universities. As you can see, these two last practices are shared with the staffing factor and the organizational structure, which will be discussed later.

Table 5 summarizes the proposed practices based on the literature, in which is referred to the factor of management of the links with universities.

Table 5: Proposed practices for the factor of management of the links with universities, based on the literature

ID.	Proposed practices
PPV1	Establish incentives so the most productive scientists of the local University locate themselves within the park to commercialize their investigations.
PPV2	The park has a person dedicated to managing and promoting the links between companies and universities.
PPV3	The park has a formal organizational structure dedicated to managing the collaboration of tenant companies with universities.

Proposed practices in the factor of understanding and knowledge of the hosted firm

Fukugawa (2006, p. 397) states that among the different factors that can affect the performance of technology parks are the infrastructure and administrative services offered to resident firms. For Monck, et al. (1988), administrative support and consulting services are crucial in the early years of resident companies. Lalkaka (2001) finds in Brazil that access to value-added services well beyond traditional physical infrastructure services would have a positive impact on resident firms. Taking into account the above, the following practice is proposed, PPH1: the park has counselors in multiple disciplines with sufficient dedication to support resident, incubated and start-up companies.

On the other hand, Lindelöf and Löfsten (2002) find that Swedish parks, in the search of the establishment and growth of their resident firms, face that these firms demand with great intensity consulting services in accounting, banking advice and legal advice provided by Lawyers; however, these authors point out that in Sweden there are few parks that can provide these services directly, i.e. with park staff. McAdam and McAdam (2008, p. 286) point out that firms have high expectations about the services they can receive from the park team, such as identifying sources of funding, arranging meetings with business advisers, and staff selecting. Based on the findings of these authors, the following practices are proposed, PPH2: the park staff provides advice to resident companies in the selection of management team; And PPH3: Park staff provides advice to resident companies in securing funding.

For Chan, Oerlemans and Pretorius (2011, p. 367) knowledge can be transferred between organizations through non-contractual bases, such as informal links. Knowledge about the creation of new products and other innovative ideas can be shared during social conversations. McAdam and McAdam (2008, p. 286) identify that one way to promote greater interaction among firms residing in a park is to generate social spaces such as work breakfasts. Based on these two references, the following practice is proposed: PPH4: park staff promote meetings and social activities (lunches, dinners, games and other recreational activities) between entrepreneurs and staff of the resident companies and the park.

The evidence collected by Colombo and Delmastro (2002, p. 1120) suggests that one of the success factors for STPs is the effective coordination of services by third parties, emphasizing the intermediary function of the park's administrative staff. These authors state that despite the evidence gathered in the Italian STPs, they have not been able to determine if the value added by the park location is attributable to the quality of the services rendered to the resident firms through the park. In the interest of obtaining some evidence in this respect, the following practice is proposed, PPH5: the park periodically evaluates the quality and relevance of the services offered directly and the services of the contracted advisers.

Ferguson and Olofsson (2004, p.16) find in Sweden that firms located in STPs have a high variability in terms of their growth and survival rates. Their evidence suggests that firms located in parks are in a wide range of developmental stages and therefore would have different needs. The authors emphasize that the high

survival rates of firms located in parks suggest that the needs are being identified and satisfactorily addressed by park management. This would be achieved by monitoring residents' behavior, which according to Chan, Oerlemans and Pretorius (2009, p. 63) is a very important task of the management of the park. Based on the findings of these authors, the following practice was proposed, PPH6: Park staff permanently carry out monitoring and identification of the needs of resident companies.

Colombo and Delmastro (2002, p.1120) also suggest that promoting the installation of large companies that have R & D laboratories, especially in the initial periods of the park, promotes the attractiveness of other companies to be located in the park, however, they do not find sufficient evidence. Roure et al (2005, p.13) recommend that political authorities, when considering the financing of park initiatives, prioritize those with a large company that can promote and lead the process of attracting occupants. For Lalkaka (2001, pp. 18, 20) the experience in China and Brazil suggests that the presence of leading companies (also called anchor companies), increase incomes and reduce dependence on subsidies by the state. Based on these arguments, the following practice was proposed, PPH7: the park has at least one well-established company with high capacities and needs in innovation, technology, knowledge and employment.

For Lalkaka and Shaffer (1999) and Lalkaka (2001), one of the lessons that can be drawn from Brazil's STPs experience is to understand that people with innovative concepts, analytical capacity and strong growth potential are not easy to find. For this reason, the selection of good business tenants is of first importance. A correct application of this concept would include a transparent and strict process for such selection. Since two practices have been proposed in this sense within the strategy factor (PPE5 and PPE7) in the present factor, no practices are proposed in this regard.

Table 6 summarizes the proposed practices based on the literature, in which is referred to the factor of understanding and knowledge of the hosted firm.

Table 6: Proposed practices in the factor of understanding and knowledge of the hosted firm based on the literature

ID.	Proposed practices
PPH1	The park has counselors in multiple disciplines with sufficient dedication to support resident, incubated, and start-ups companies.
PPH2	The park staff provides advice to resident companies in the selection of the management team.
PPH3	The park staff provides advice to resident companies in the obtainment of the funding
PPH4	The park staff promotes meetings and social activities (lunches, dinners, games and other recreational activities) between entrepreneurs and staff of resident companies and the park.
PPH5	The park periodically evaluates the quality and relevance of the services offered directly and the services of the contracted advisers.
PPH6	The park staff is constantly monitoring and identifying the needs of resident companies.
PPH7	The park has at least one well-established company with high capacities and needs in innovation, technology, knowledge and employment.

Proposed practices in the factor of facilities management

This section shows the theoretical references that allowed to propose practices related to the actions carried out by the administration of a park when managing its facilities.

Dettwiler et al (2006) argue that the management of facilities in STPs is a fundamental element that contributes to the improvement of the business environment and that is an explanatory factor of the performance and growth of the firms that are in them. They also say that the management of facilities in STPs contributes to the generation of scenarios for interaction, relations among companies and the formation of networks. Dettwiler et al (2006, p.512) find that, although the main interest of firms to be located in parks is their proximity to universities, their interest in being close to their competitors in the same business sector is not negligible, nor is it located near other firms of the same type. For this last reason, the following is proposed as a practice: PPI1: the physical distribution within the park, contemplates that the companies of the same industry or technological sector must be located together in a specific area of the park. In contrast to the previous practice, Chan, Oerleman and Pretorius (2009) warn and conclude that interorganizational networks can have both positive and negative effects for firms located in STPs. One of the negative effects would be related to the physical proximity of the firms within the park. Such closeness would allow neighboring firms to be monitored, thus allowing the possibility of imitation of innovative activities, discouraging collaboration between firms, and by this way, decreasing the Innovative performance of the park as a whole. To deal with this negative effect Chan, Oerleman and Pretorius (2009, p. 63) propose the relocation of firms as far as possible from those with similar technological profiles or operating in similar industrial sectors. According to these last authors, the following practice is proposed: PPI2: the physical distribution within the park, contemplates that the companies of the same industry or technological sector are as far as possible.

Although interaction is an important tool to transfer knowledge and is a condition that allows the growth of firms (Dettwiler et al, 2006), there is another negative effect related to physical closeness, sharing facilities and interacting with other firms. For Dettwiler and Brochner (2003) the character of each firm, as well as the sector in which it operates, will determine the quantity and intensity of the interactions they create with their environment. Much openness and interaction with the environment can be seen by some firms as threats to keep the secrecy or confidentiality of important aspects for their growth. From the above it is clear that the administration of a park should contemplate in the design and management of its facilities how to mitigate these perceptions. As a result of the above, the following practice is proposed, PPI3: the infrastructure of the park is designed to maintain the confidentiality of activities and protect the industrial secrecy and other forms of intellectual property of resident companies.

The availability and quality of infrastructure services has shown the interest of some STP researchers. Fukugawa (2006, p. 397) points to physical infrastructure services as one of the most important factors explaining variations in STP performance. If we add to this, the importance pointed out by McAdam and

McAdam (2008, p. 286) and Colombo and Delmastro (2002, p. 1120) regarding the quality of the services offered by the park administration to resident companies, the following practices could be proposed, PPI4: the park periodically evaluates if the amount and the spatial distribution of the infrastructure offered is the adequate for the needs of the resident companies; And PPI5: the park periodically evaluates if the internet / telecommunications infrastructure offered is the adequate for the needs of resident companies.

Table 7 summarizes the proposed practices based on the literature, in which is referred to the factor of facilities management.

Table 7: Proposed practices in the factor of facilities management based on the literature

ID.	Proposed practices
PPI1	The physical distribution within the park, contemplates that the companies of the same industry or technological sector must be located together in a specific area of the park.
PPI2	The physical distribution within the park, contemplates that the companies of the same industry or technological sector are as far as possible.
PPI3	The infrastructure of the park is designed to maintain the confidentiality of activities and protect the industrial secrecy and other forms of intellectual property of resident companies.
PPI4	The park periodically evaluates if the amount and the spatial distribution of the infrastructure offered is the adequate for the needs of the resident companies
PPI5	The park periodically evaluates if the internet/telecommunications infrastructure offered is the adequate for the needs of resident companies.

Proposed practices in the factor of personnel and organizational structure.

Fukugawa (2006) considers the organizational structure as one of the factors that can explain the difference in the results of the Japanese STPs. Colombo and Delmastro (2002), noting the considerable heterogeneity of Italian and UK STPs in terms of organization and management, wonder if there is a successful organizational STP model. The evidence they find suggests that a success factor includes a lean and agile internal organization and effective coordination of services provided by third parties, emphasizing the intermediation carried out by park staff. Salvador (2011) says that STP staff should be considered as a dedicated workforce to address funding issues and ongoing monitoring of improved management competencies and the achievement of the credibility of hosted firms. According to the arguments described above, where staff choice and flexibility of the organizational structure are favored in order to respond to the needs of resident firms, PPP1 is proposed: park staff are chosen to support the specific needs of Resident companies; And PPP2: the organizational structure and staff of the park are established in a flexible manner according to the needs of resident companies.

For Lalkaka (2001), the experience in China and Brazil suggests that the formation of a well-trained team fully dedicated to park activities has a positive impact on its results. According to Siegel, et al. (2003), apart from unmanaged STPs, one of the ways of managing a park would consist of a group of people physically located on the park site implying a formally management structure

That would provide a basis for long-term development. Once the need for the existence of the personnel and organizational units for the administration of the park is justified, it would be necessary to specify the functions or responsibilities that they would be in charge. Considering the literature reviewed in the previous factors, naturally arises the intention to evaluate what role would play the personnel and the organizational structure in these factors.

As for the factor that corresponds to the understanding and knowledge of the installed firm, it has already been pointed out that the firms located in parks are in a wide range of development phases and therefore would have different needs (Ferguson and Olofsson, 2004, p. 16), especially young firms for which administrative support and consulting services are crucial (Monck et al., 1988). Therefore, monitoring the behavior of residents is a very important task for the management of the park, (Chan, Oerlemans and Pretorius, 2009, p. 63) to such an extent that the infrastructure and administrative services offered to resident firms would be decisive in the performance of the technology parks (Fukugawa, 2006, p. 397). Given the importance described above, it would be useful to analyze the role of the personnel assignment and the existence of organizational units dedicated to the understanding and knowledge of the hosted firm. Therefore, the following practices are proposed: PPP3: The park has at least one Person dedicated to make efforts to understand and know the needs of hosted firms. As a practice that would involve a more formal action of the park it would be, PPP4: The park has a formal organizational structure dedicated to making efforts to understand and know the needs of hosted firms.

For its part, the management of the facilities includes aspects of personnel and organizational structure that would be worth analyzing. The management of the facilities is an explanatory factor of the performance and growth of the firms that are in STPs because it contributes to the generation of scenarios for the interaction, the relations between companies and the formation of networks among the resident firms (Dettwiler et al, 2006) the interaction in the different scenarios of the park can also have negative effects such as the imitation of innovations of the competitors (Chan, Oerleman and Pretorius, 2009, page 63) and aversion to collaboration for fear of losing confidentiality of innovations (Dettwiler and Brochner, 2003). In both the promotion of interactions and the mitigation of the negative effects it would bring, park staff would have the responsibility to mediate among resident firms. This mediation could be in two levels: a formal one where there is a unit in the organizational structure of the park with defined functions; And a less formal level where a staff is assigned these functions without this resulting in the creation of charges or the modification of the organizational structure. Based on the above arguments, the following practices are proposed, PPP5: The park has at least one person dedicated to managing facilities for entrepreneurs and resident companies. As a practice that would involve a more formal action of the park would have, PPP6: The park has a formal organizational structure dedicated to managing facilities for entrepreneurs and resident companies.

For Wessner (2009) the management team's training and experience is fundamental for the development of STPs: well-trained staff would facilitate networking among researchers, entrepreneurs, investors, and other key players in the park-related innovation ecosystem. The evaluation of the training and experience of all the personnel related to a park would be an expensive process both in the collection and in the processing of the data so it is advisable to make measurements in this process. As it has been described, in the present work three factors have been considered that correspond to the fundamental activities in the concept of STPs: Management of links with universities, understanding and knowledge of the hosted signature and management of Facilities for entrepreneurs and resident companies. Consequently, practices related to the selection, based on training and experience, of those responsible for managing these factors will be evaluated. The evaluation of training and experience is based on the areas proposed by Lindelöf and Löfsten (2002): marketing, management, finance, research, technology management, accounting and sales management. Due to this, each family (from PPP7 to PPP12. See Table 8) would be composed of seven practices, which would lead to a total of 42 possible practices related to the selection of STP staff based on training in higher education and Professional experience in certain areas.

Table 8 summarizes the proposed practices based on the literature, in which is referred to the factor of personnel and organizational structure.

Table 8: proposed practices for the factor of personnel and organizational structure, based on the literature

ID.	Proposed practices
PPP1	The park staff is chosen to support the specific needs of resident companies.
PPP2	The organizational structure and staff of the park are established in a flexible manner according to the needs of resident companies.
PPP3	The park has at least one person dedicated to realize management in order to understand and know the needs of the hosted firms.
PPP4	The park has a formal organizational structure dedicated to making efforts to understand and satisfy the needs of the hosted firms.
PPP5	The park has at least one person dedicated to managing facilities for entrepreneurs and resident companies.
PPP6	The park has a formal organizational structure dedicated to managing facilities for entrepreneurs and resident companies.
PPP7	The person in charge of managing links with universities is chosen for having higher education training in specific areas.
PPP8	The person in charge of the management of the links with universities is chosen for having professional experience in specific areas.
PPP9	The person in charge of the understanding and knowledge of the hosted firm is chosen for having higher education training in specific areas.
PPP10	The person in charge of the understanding and knowledge of the hosted firm is chosen for having professional experience in specific areas.
PPP11	The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having formation of higher education in specific areas.
PPP12	The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having professional experience in specific areas.

Results from the Delphi study

In this section, the results obtained in the three round Delphi study described in the methodological design, are described and discussed. The results will be presented in chronological order in which each of the rounds took place. As general results, Table 9 shows some general identification characteristics of the STPs studied and that participated in each one of the rounds. Regarding the representativeness of the sample of STPs in each one of the rounds, it can be noted that in all the analyzed variables, the proportions of the population in each one of the intervals present in the table, have values close to the same intervals in the samples of the first and second round. It can also be observed that when comparing these intervals in the samples of the first and second round are statistically similar, this because the differences between them are much smaller than the margin of error for each one of the samples. The difference in the proportions between the sample of the third round and the population invited to participate in the study is slightly higher, however it is within the expected margin of calculated error.

Table 9: Statistics and frequencies distribution for the main population variables and for the participant Parks in each round

Variable	Statistics	Interval	Guests	%	1st round		2nd round		3rd round		
					%	%	%	%			
Age of the park	Mean	16,02	Less than 8 years	9	10,8	2	9,1	2	10,0	2	14,3
	S-D	8,07	Between 8 and 16 years	38	45,8	8	36,4	6	30,0	2	14,3
	Minimum	5	More than 16 years	36	43,4	12	54,5	12	60,0	10	71,4
	Maximum	43	Total	83	100,0	22	100,0	20	100,0	14	100,0
Resident companies	Mean	325,23	Less than 325	73	88,0	21	95,5	19	95,0	13	92,9
	S-D	1.510,70	Between 325 and 1500	8	9,6	1	4,5	1	5,0	1	7,1
	Minimum	3	More than 1500	2	2,4	0	0,0	0	0,0	0	0,0
	Maximum	13.629	Total	83	100,0	22	100,0	20	100,0	14	100,0
Built area (millions of m ²)	Mean	1,7	Less than 1,7	74	91,4	21	100,0	19	100,0	13	100,0
	S-D	8,4	Between 1,7 and 10	4	4,9	0	0,0	0	0,0	0	0,0
	Minimum	0,0002	More than 10	3	3,7	0	0,0	0	0,0	0	0,0
	Maximum	70,4	Total	81*	100,0	21	100,0	19	100,0	13	100,0
Annual revenues (U\$ millions)	Mean	1.822,35	Less than 1.800	75	91,5	21	95,5	19	95,0	13	92,9
	S-D	7.789,46	Between 1.800 and 10.000	4	4,9	1	4,5	1	5,0	1	7,1
	Minimum	0,003	More than 10.000	3	3,7	0	0,0	0	0,0	0	0,0
	Maximum	57.189,44	Total	82*	100,0	22	100,0	20	100,0	14	100,0

S-D: Standard deviation
*Some parks did not report information for certain variables, for this, the total doesn't correspond.

First round

The most important results of the first round were as follows: The first is the proposition of 25 practices by seven of the responding STP managers (see Table 12). As second important result, we have those practices proposed by the author from the review of the literature and that was confirmed its execution in at least 50% of the responding STPs and reaching a total of 41, standing out 26 of these practices by at least 73% of responding STPs (see Table 10). The third important result, refers to the exclusion of the analysis of sixteen practices proposed by the author, because no park reported its execution. It should be noted that all of them were classified in the Personnel and Organizational Structure factor (see Table 11). Another 17 practices that were reported by less than 30% of responding STPs were also eliminated from the study (see Table 12).

As a result of this first round were selected to be analyzed in the second round a total of 92 practices. Likewise, a summary of the analysis carried out by the respondents in the first round can be seen in Table 10.

Table 10: Summary of the Management practices analyzed in the first round

Practices proposed by the author based on the review of the literature.		100	80%
L	Leadership	23	18%
E	Strategy	8	6%
V	Links with universities	3	2%
H	Understanding of the hosted company	7	6%
I	Facilities management	5	4%
P	Personnel and organisational structure	54	43%
Management practices proposed by the participants in the Delphi study.		25	20%
L	Leadership	4	3%
E	Strategy	7	6%
V	Links with universities	4	3%
H	Understanding of the hosted company	5	4%
I	Facilities management	1	1%
P	Personnel and organisational structure	4	3%
Total of practices studied in the first round		125	100%
Management practices executed by at least 73% of the STPs that participated in the Delphi.		26	21%
Practices excluded from the study for not being executed in the STPs that participated in the Delphi.		16	13%
Practices excluded for having an execution in less than 30% of the respondent STPs.		17	14%
Total of practices that pass to be analyzed in second round		92	74%
Management practices proposed by the participants in the Delphi and that pass to the second round.		25	20%
Practices proposed by the author based on the review of the literature and that pass to the second round.		67	54%
L	Leadership	20	16%
E	Strategy	3	2%
V	Links with universities	3	2%
H	Understanding of the hosted company	7	6%
I	Facilities management	5	4%
P	Personnel and organisational structure	29	23%

Table 12 shows the Management Practices proposed by the participants in the Delphi. From the author's point of view, these practices have a structure similar to those identified in the literature. That is, they are statements that describe the specific way in which a process is developed in an organization (Cf. O'Leary, 2007). In order to avoid influencing the qualifications of the respondents, explanations or consequences derived from the practices were not included in the statements presented for consideration in the instruments. As it can be seen, the practices proposed by the respondents and coded as PDE2 and PDE3 were written with an explanation or consequence of the implementation of the practice. Consequently, these explanations were eliminated for the following rounds. This action is carried out within the attributions that the Delphi

methodology gives to the coordination of the study and that were explained in the methodological design (see Table 11).

Table 11: New redaction of proposed practices by the respondents in the first round

ID	Proposed practices by the respondents	New redaction of the proposed practice
PDE2	The park has a very small shareholder base. This has allowed a unity of criteria in its strategic planning.	The park has a very small shareholder base.
PDE3	The park has a wide and diversified shareholder base. This has enabled funding and valuable strategic knowledge.	The park has a wide and diversified shareholder base.

Table 12: Management practices proposed by the participants in the Delphi

Factor	Practice
Leadership (L)	PDL1 The director of the park is chosen for having training and experience in administrative sciences
	PDL2 The director of the park is chosen for having training and experience in engineering
	PDL3 The director of the park comes from the private sector and has experience in management positions of guilds or large companies.
	PDL4 The park manager has the autonomy to choose his team and propose annual goals and plans.
Strategy (E)	PDE1 The park does not have its own board of directors, the board of the manager university of the park defines the strategic aspects and supervises its implementation.
	PDE2 The park has a very small shareholder base. This has allowed a unity of criteria in its strategic planning.

	PDE3	The park has a wide and diversified shareholder base. This has enabled funding and valuable strategic knowledge.
	PDE4	The park does not restrict the industrial sectors or the economic activities that the resident companies develop.
	PDE5	The park restricts the admission of resident companies to certain industrial sectors (eg electronics, chemicals, etc.) and applies other strict admission criteria related to the generation of employment or innovations.
	PDE6	The park sells infrastructure services in order to finance its growth in infrastructure, equipment and personnel.
	PDE7	The park has a board of directors that although it counts on the participation of the government / administrations and local universities is completely autonomous in its decisions
Links with universities (V)	PDV1	The partner university (s) concentrate large investments in scientific equipment in the park in order to motivate the most productive scientists to move to their facilities.
	PDV2	The most productive scientists of the partner university (s) are installed in the park.
	PDV3	The scientists of the partner university (s) who are installed in the park, decide freely how to invest the resources obtained by the sale of scientific services.
	PDV4	The partner university (s) provides preferential support to the initiatives leading to the acquisition of equipment and infrastructure that are presented by the scientists located in the park.
Understanding of the hosted firm (H)	PDH1	The park has at least one person dedicated to understanding the needs of entrepreneurs and tenant companies.
	PDH2	The park has a formal organizational structure dedicated to understanding the needs of entrepreneurs and tenant companies.
	PDH3	The park has staff dedicated specially to the incubation of new companies
	PDH4	The infrastructure of the park is designed to promote the free circulation of knowledge and open innovation among resident companies.
	PDH5	The park periodically collects and monitors information on its local impact in terms of innovation, business and employment generation, and financial results of resident companies.
Facilities equipment and infrastructure that management (I)	PDI1	The park staff provides preferential support to initiatives that conduct to the acquisition of equipment and infrastructure that management (I) are presented by resident companies.
Personnel and organizational structure (P)	PDP1	The park has at least one person dedicated to administrative tasks.
	PDP2	The park has a formal organizational structure dedicated to administrative tasks.
	PDP3	Park staff strive to maintain strong links with universities, industry guilds and local governments / administrations.
	PDP4	The park staff is qualified to support the specific needs of resident companies

All the practices proposed by the respondents and that are presented in Table 12, after the modifications described in Table 11, were subjected to a new analysis in the second round.

Table 13: Management practices executed for at least 73% of the STPs that participated in the Delphi

Factor	%	Code	Practice
Leadership(L)	100	PPL5	The director of the park is chosen for having higher education training in specific areas.
	100	PPL5.2	The director of the park is chosen for having higher education training in management.
	100	PPL6	The director of the park is chosen for having professional experience in specific areas.
	100	PPL6.2	The director of the park is chosen for having professional management experience.

	100 PPL8	The STP director is chosen for periods of five years or more.
	82 PPL5.5	The director of the park is chosen for having higher education training in technology management.
	82 PPL6.5	The director of the park is chosen for having professional experience in technology management.
	77 PPL1	The director of the park is chosen for having previous experience in management positions in the industry.
	77 PPL6.1	The director of the park is chosen for having professional marketing experience.
	77 PPL6.3	The director of the park is chosen for having professional experience in finance.
	73 PPL9	The director of the park is chosen for having experience in entrepreneurship.
Links with universities (V)	86 PPV1	Establish incentives for the most productive scientists of the local university so they locate themselves in the park to commercialize their research.
	77 PPV2	The park has a person dedicated to managing and promoting the links between companies and universities.
Understanding of the hosted firm (H)	95 PPH6	The park staff is constantly monitoring and identifying the needs of resident companies.
	95 PPH7	The park has at least one well-established company with high capacities and needs in innovation, technology, knowledge and employment.
	91 PPH5	The park periodically evaluates the quality and relevance of the services offered directly and the services of the contracted advisers.
	86 PPH3	The park staff provides advice to resident companies in funding procurement
	82 PPH4	The park staff promotes meetings and social activities (lunches, dinners, games and other recreational activities) between entrepreneurs and staff of resident companies and the park.
	73 PPH1	The park has counselors in multiple disciplines with sufficient dedication to support resident, incubated and start-up businesses.
Facilities management (I)	86 PPI4	The park periodically evaluates if the amount and the spatial distribution of the infrastructure offered is adequate for the needs of resident companies.
	82 PPI5	The park periodically evaluates if the internet / telecommunications infrastructure offered is adequate for the needs of resident companies.
Personnel and organizational structure (P)	95 PPP12.2	The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having professional experience in management.
	86 PPP11.2	The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having high education training in management.
	86 PPP12.5	The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having professional experience in technology management.
	77 PPP1	The park staff is chosen to support the specific needs of resident companies.
	73 PPP11.5	The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having high education training in technology management.

Table 13 describes the Management Practices executed by at least 73% of STPs participating in Delphi. Within the Leadership factor (L), stand out PPL5.2 ("The director of the park is chosen for having higher education training in management"); PPL6.2 ("The park manager is chosen for having professional management experience"); And PPL8 ("The STP director is chosen for periods of five years or more"); The previous practices were reported as executed in all of the responding STPs. The practice PPV1 ("Establishing incentives for the most productive scientists of the local university so they locate themselves in the park to commercialize their research") was reported with an execution of 86% of participating STPs.

Regarding the factor of understanding of the hosted firm (H), two practices stand out with a performance of 95% of the respondents: PPH6 ("The park staff permanently carries out monitoring activities and identification of the needs of resident companies"); And PPH7 ("The park has at least one well established company with high capacities and needs in innovation, technology, knowledge and employment").

Practices PPI4 ("The park periodically evaluates, if the amount and spatial distribution of the infrastructure offered is adequate for the needs of resident companies"); And PPI5 ("The park periodically evaluates, if the internet / telecommunications infrastructure offered is adequate for the needs of resident companies"); Were reported with an execution of 86% and 82%, respectively, of the participating STPs. The above in regard to the factor of facilities management (I).

The analysis for the Personnel and Organizational Structure factor (P), provided three practices with more than 85% of execution of the participants: PPP12.2 ("The person in charge of the management of facilities for entrepreneurs and resident companies is chosen for having professional experience in management ") with a 95% of execution. PPP11.2 ("The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having higher education training in management") and PPP12.5 ("The person in charge of the management of the facilities for Entrepreneurs and resident companies are chosen because they have professional experience in technology management ") both obtained an execution of 86% of the STPs studied. As described in the methodological design, in the first round, those practices with a 30% execution of the STPs studied or a lower proportion would be excluded. A total of 33 practices were eliminated. Sixteen of them did not have an execution report for any STP, and all were classified in the Factor related to Personnel and Organizational Structure (see Table 14). These practices were excluded from the study because they were not executed on the STPs participating in the Delphi study); The other seventeen excluded from the study, can be consulted in Table 15.

Second round

Once excluded the 33 practices that in the first round got an execution of less than the 30% of the respondent STPs, it was proceeded to the second round with the 92 practices that remained. With the list of practices obtained in the first round we proceeded to consult the 47 individuals who answered affirmatively the invitation to participate in the study. Each participant was asked to rate on a ninepoint scale the effect that each practice would have on STP performance results. The most important results of the second round were as follows: the first of these is the fact that all the 25 practices proposed by seven of the respondent STP managers continued in the analysis because they had a response rate higher than 40% of respondents (see Table 16). As a second important result, it is had the exclusion of the analysis of ten low-response management practices, this is, a response rate of 30% of respondents or lower (see Table 17).

Other important results of for each of the studied factors are as follows: in the Leadership factor (L), 21 practices obtained a response rate of 40% or more of the respondents (see Table 15); In the Strategy factor (E), ten practices reached a response rate of 40% or more of the respondents (see Table 16), in the Linkage with Universities factor (V), six practices were rated by 60% Or more of the 20 respondents (see Table 17), as for the Understanding of the hosted firm factor (H), twelve practices achieved response rates of 40% or higher (see Table 21).

Table 14: Practices that were excluded from the study for not being executed in the STPs that participated in the Delphi

Factor	Practice
Personnel and organizational structure (P)	PPP11.1 The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having higher education training in marketing.
	PPP11.3 The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having higher education training in finances.
	PPP11.6 The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having higher education training in accounting.
	PPP11.7 The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having higher education training in commercial management (sales).
	PPP12.1 The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having professional experience in marketing.
	PPP12.3 The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having professional experience in finances.
	PPP12.6 The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having professional experience in accounting.
	PPP12.7 The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having professional experience in commercial management (sales).
	PPP7.3 The person in charge of the management of the links with universities is chosen for having higher education training in finances.
	PPP7.6 The person in charge of the management of the links with universities is chosen for having higher education training in accounting.
	PPP7.7 The person in charge of the management of the links with universities is chosen for having higher education training in commercial management (sales).
	PPP8.1 The person in charge of the management of the links with universities is chosen for professional experience in marketing
	PPP8.3 The person in charge of the management of the links with universities is chosen for professional experience in finances.
	PPP8.6 The person in charge of the management of the links with universities is chosen for professional experience in accounting.
	PPP8.7 The person in charge of the management of the links with universities is chosen for professional experience in commercial management (sales).
	PPP9.1 The person in charge of the understanding and knowledge of the hosted firm is chosen for having higher education training in marketing

Table 16 shows a summary of the analysis carried out by the respondents in the second round. Table 17 shows the management practices excluded in the second round by low response rates.

As it was already explained, it is considered a low response rate, one that reaches a value of 30% or less of the respondents. For this reason, ten practices were eliminated from the analysis, all of them proposed by the author. Six practices correspond to the Personal and Organizational Structure factor (P); Three to the Leadership factor (L), and one of them to the Link with Universities factor (V). It should be noted that within this group of excluded practices, the average scores were around 3, as well as the few individual qualifications that were obtained, were mostly concentrated in the region comprised of (1-3), indicating that the few responders who qualified these practices, considered that these practices have a low effect on the performance of STPs. Due to the above, it is considered plausible the elimination of these items.

Table 15: Practices whose execution was reported for less than 30% of the respondent STPs

Factor	%	Code	Practice
Leadership (L)	18	PPL4	The director of the park is chosen for having previous balanced experience in management positions in industry, public sector / government and universities.
	27	PPL5.6	The director of the park is chosen for having higher education training in accounting.
	27	PPL6.6	The director of the park is chosen for having professional experience in accounting.
	23	PPL6.7	The director of the park is chosen for having professional experience in commercial management (sales).
Strategy (E)	18	PPE3	At the time of creating the park, a separate and autonomous legal entity of the founders was also created to take care of its administration
	14	PPE4	At the time of creating the park, through an informal and flexible agreement, the founders shared the tasks of its administration, without a person dedicated full time to these activities.
	18	PPE6	At the time of creating the park, there were not defined strict criteria to admit tenants, any type of business can be admitted in the park.
	18	PPE7	The park admits residents belonging to a reduced base (few) of industrial or technological sectors
Personnel and organizational structure (P)	14	PPP10	The person in charge of the understanding and knowledge of the hosted firm is chosen for having professional experience in specific areas.
	14	PPP10.4	The person in charge of the understanding and knowledge of the hosted firm is chosen for having professional experience in research.
	9	PPP11	The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having higher education training in specific areas.
	14	PPP12	The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having professional experience in specific areas.
	18	PPP7	The person in charge of managing links with universities is chosen for having higher education training in specific areas.
	9	PPP7.1	The person in charge of the management of the links with universities is chosen for having higher education training in marketing.
	9	PPP8	The person in charge of the management of the links with universities is chosen for having professional experience in specific areas.
	14	PPP9	The person in charge of the understanding and knowledge of the hosted signature is chosen for having higher education training in specific areas.
	14	PPP9.4	The person in charge of the understanding and knowledge of the hosted signature is chosen for having higher education training in research.

Table 16: Summary of the management practices analyzed in the second round

Management practices proposed by the participants in the Delphi study		25	27%
I	Leadership	4	4%
E	Strategy	7	8%
V	Links with universities	4	4%
H	Understanding of the hosted company	5	5%
I	Facilities management	1	1%
P	Personnel and organizational structure	4	4%
Practices proposed by the author based on the review of the literature.		67	73%
L	Leadership	20	22%
E	Strategy	3	3%
V	Links with universities	3	3%
H	Understanding of the hosted company	7	8%
I	Facilities management	5	5%
P	Personnel and organizational structure	29	32%
Total of practices analyzed in the second round		92	100%
Management practices proposed by the participants in the Delphi study that pass to the third round		25	27%
Practices proposed by the author based on the review of the literature that pass to the third round		57	63%
Total of practices that pass to the third round		82	89%

Table 17: Management practices that were excluded in the second round for having a low response rate

Factor	Code	Practice	R	%R	P	(1-3)	(4-6)	(7-9)
Leadership (L)	PPL5.3	The director of the park is chosen for having higher	6	30%	3,1 7	20%	10%	0%

		education training in finance.						
	PPL5.7	The director of the park is chosen for having higher education training in commercial management (sales).	5	25%	2,8 0	25%	0%	0%
	PPL4	The director of the park is chosen for having previous balanced experience in management positions in industry, public sector/government and universities.	4	20%	3,2 5	10%	10%	0%
Links with universities (V)	PPV3	The park has a formal organizational structure dedicated to 6 managing the collaboration of tenant companies with universities.		30%	2,6 7	30%	0%	0%
Personnel and organizational structure (P)	PPP10.1	The person in charge of the understanding and knowledge 6 of the hosted firm is chosen for having professional marketing experience.		30%	3,0 0	20%	10%	0%
	PPP11.4	The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having higher education training in investigation.	6	30%	3,0 0	20%	10%	0%
	PPP12.4	The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having professional experience in investigation.	6	30%	3,5 0	10%	20%	0%
	PPP9.5	The person in charge of the understanding and knowledge of the hosted firm is chosen for having higher education training in technology management	6	30%	2,6 7	30%	0%	0%
	PPP9.6	The person in charge of the understanding and knowledge of the hosted firm is chosen for having higher education training in accounting.	6	30%	2,6 7	30%	0%	0%
	PPP9.7	The person in charge of understanding and knowledge of the hosted firm is chosen for having higher education training in commercial management (sales).	6	30%	3,3 3	15%	15%	0%

In Table 18, Management Practices can be observed in the Leadership factor (L) with higher average scores and a response rate of more than 30% in the second round. The most outstanding result regarding the information in the table is the practices PDL3 and PDL1 that have reached a response rate of 55% and obtained average scores of 8.18 and 7.00 respectively. From PDL3, which corresponds to the practice "The director of the park comes from the private sector and has experience in management positions of guilds or large companies", the high degree of agreement (91% of the respondents) that placed this practice in the region that indicates a high effect on the performance of the STP is highlighted. According to the methodological design of this paper, there is a relative agreement among the respondents (73%) that this practice has a high impact on overall STP performance.

In which is referred to the response rate, within the practices that were analyzed in the leadership factor (L), five of them that got a rate of 100% are highlighted:

PPL8: The director of the STP is chosen for periods of five years or more.

PPL6.2: The director of the park is chosen for having professional experience in management.

PPL6: The director of the park is chosen for having professional experience in specific areas.

PPL5.2: The director of the park is chosen for having higher education training in management.

PPL5: The director of the park is chosen for having higher education training in specific areas.

Management Practices in the Strategy factor (E) with higher average scores and response rate of more than 30% in the second round can be seen in Table 19. The PDE4 practice can be highlighted: "The park does not restrict the industrial sectors nor the economic activities developed by the resident companies"; This is due to the fact that it obtained an average score in the high-impact zone in the general STP performance, as well as a high response rate (85%). In spite of the above, it did not reach the minimum level (70% of respondents in the high impact area) to affirm that there was a relative agreement among the respondents.

Table 18: Management practices in the leadership factor (L) with higher average scores and response rate higher than 30% in the second round

Code	Practice	R	%R	P	(1-3)	(4-6)	(7-9)
PDL3	The director of the park comes from the private sector and has 9% experience in management positions of guilds or large companies.	11	91%	11	55%	8,18	0%
PDL1	The director of the park is chosen for having training and experience 27% in administrative sciences	11	73%	11	55%	7,00	0%
PDL2	The director of the park is chosen for having training and experience 33% in engineering	9	67%	9	45%	7,00	0%
PDL4	The director of the park has the autonomy to choose his team and propose annual goals and plans. 30%	10	60%	10	50%	6,80	10%
PPL9	The director of the park is chosen for having experience in entrepreneurship. 43%	14	7%	14	70%	3,50	50%
PPL3	The director of the park is chosen for having previous experience in positions in universities. 58%	12	33%	12	60%	3,50	8% management
PPL2	The director of the park is chosen for having previous experience in management positions in the public / government sector. 42%	12	8%	12	60%	3,50	50%
PPL7	The park has a dedicated full-time director to manage it. 15	15	75%	3,33	60%	33%	7%
PPL8	The director of the STP is chosen for periods of five years or more. 35%	20	5%	20	100%	3,25	60%
PPL6.5	The director of the park is chosen for having professional experience 44% in technology management.	16	0%	16	80%	3,13	56%
PPL5.5	The director of the park is chosen for having higher education 44% training in technology management.	16	0%	16	80%	3,13	56%
PPL5.1	The director of the park is chosen for having higher education 43% training in marketing.	14	0%	14	70%	3,07	57%
PPL6.2	The director of the park is chosen for having professional 40% management experience.	20	0%	20	100%	3,05	60%
PPL6	The director of the park is chosen for having professional experience 40% in specific areas.	20	0%	20	100%	3,05	60%
PPL5.2	The director of the park is chosen for having higher education 40% training in management.	20	0%	20	100%	3,05	60%
PPL5	The director of the park is chosen for having higher education 40% training in specific areas.	20	0%	20	100%	3,05	60%

PPL6.1	The director of the park is chosen for having professional marketing 38% experience. 0%	16	80%	3,00	63%
PPL5.4	The director of the park is chosen for having higher education 40% training in research. 0%	10	50%	3,00	60%
PPL6.4	The director of the park is chosen for having professional experience 38% in research. 0%	8	40%	3,00	63%
PPL6.3	The director of the park is chosen for having professional experience 33% in finance. 0%	15	75%	2,93	67%
PPL1	The director of the park is chosen for having previous experience in 33% management positions in the industry. 0%	15	75%	2,93	67%
R: Number of respondents. %R: Response rate over N=20. P: Average score					
(1-3): % Responses in this region. (4-6): % Responses in this region. (7-9): % Responses in this region					

Next, Table 20 presents Management Practices in the Links with universities factor (V), with higher average scores and a response rate higher than 30% in the second round. The PDV3 practice stands out: "The scientists of the partner university (s) who are installed in the park, decide freely how to invest the resources obtained by the sale of scientific services"; which with a response rate of 65% obtains an average score in the area of high impact on STP performance. In spite of the above, it does not achieve the minimum level for the relative agreement.

Table 19: Management practices in the Strategy factor (E) with higher average scores and response rate higher than 30% in the second round

Code	Practice	R	%R	P	(1-3)	(4-6)	(7-9)
PDE4	The park does not restrict the industrial sectors or the economic activities that the resident companies develop.	17	85%	7,29	6%		
PDE7	The park has a board of directors that, although it has the government/local administrations and universities, is completely autonomous in its decisions.	13	65%	7,00	8%		
PDE5	The park restricts the admission of resident companies to certain Electronics, chemicals, etc.) and applies other strict admission criteria related to the generation of employment or innovations.	12	60%	6,75	8%		
PDE3	The park has a wide and diversified shareholder base. This has enabled funding and valuable strategic knowledge.	11	55%	6,45	9%		
PDE2	The park has a very small shareholder base. This has criteria in its strategic planning.	13	65%	5,92	15%		
PDE6	The park sells infrastructure services in order to finance its growth in infrastructure, equipment and personnel.	15	75%	5,67	13%		
PDE1	The park does not have its own board of directors. The university defines the strategic aspects and supervises its implementation.	8	40%	5,63			
PPE2	The park was created by a wide base of founders (more than two).	9	45%	3,11	67%		
PPE1	The park was created by a very small base of founders (maximum two)	11	55%	3,00			
PPE8	The park admits residents belonging to a broad base (many) of industrial or technological sectors.	13	65%	2,92	69%		

R: Number of respondents. %R: Response rate over N=20. P: Average score (1-3): % Responses in this region. (4-6): % Responses in this region. (7-9): % Responses in this region
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In what is referred to Management Practices in the Understanding of the hosted firm factor (H), the second round, highlights two practices: PPH7 and PDH4. The first one, PPH7: "The park has at least one well-established company with high capacities and needs in innovation, technology, knowledge and employment"; This practice achieved a response rate of 90% and achieved a level of agreement where 78% of the respondents rated it in the region of high impact on overall STP performance. The other practice to highlight, PDH4: "The infrastructure of the park is designed to promote the free circulation of knowledge and open innovation among resident companies"; had a similar behavior in this phase of analysis: the response rate was 85% and the level of agreement among the respondents in placing it in the high impact area was 76%. Details of Management Practices in the Understanding of the hosted firm factor (H) with higher average scores and response rate over 30% in the second round can be seen in Table 21.

Table 20: Management practices in the Links with universities factor (V) with higher average scores and response rate over 30% in the second round

Code	Practice	R	%R	P	(1-3)	(4-6)	(7-9)
PDV 3	The scientists of the partner university (s) who are installed in the park, decide freely how to invest the resources obtained by the sale of scientific services.	1 3	65 %	7,6 9	0%	31%	69%
PDV 1	The partner university (s) concentrate large investments in scientific equipment in the park in order to motivate the most productive scientists to move to their facilities.	1 2	60 %	7,0 8	8%	33%	58%
PDV 2	The most productive scientists of the partner university (s) are installed in the park.	1 2	60 %	6,6 7	0%	58%	42%
PDV 4	The partner university (s) provide (s) preferential support to the initiatives leading to the acquisition of equipment and infrastructure that are presented by the scientists located in the park.	1 5	75 %	6,5 3	13%	40%	47%
PPV 1	Establish incentives for the most productive scientists of the local university so they locate themselves in the park to commercialize their investigation.	1 7	85 %	3,1 8	53%	47%	0%
PPV 2	The park has at least one person dedicated to managing and promoting the links of tenant companies with universities.	1 6	80 %	3,0 0	63%	38%	0%
R: Number of respondents. %R: Response rate over N=20. P: Average score (1-3): % Responses in this region. (4-6): % Responses in this region. (7-9): % Responses in this region							

Table 21: Management practices in the Understanding of the host company factor (H) with higher average scores and response rate over 30% in the second round

Code	Practice	R	%R	P	(1-3)	(4-6)	(7-9)
PPH 7	The park has at least one well-established company with high capacities and needs in innovation, technology, knowledge and employment.	18	90%	7,6 7	11%	11%	78%

PDH 4	The infrastructure of the park is designed to promote the free circulation of knowledge and open innovation among resident companies.	17	85%	7,6 5	6%	18%	76%
PDH 2	The park has a formal organizational structure dedicated to understanding the needs of entrepreneurs and tenant companies.	10	50%	7,5 0	10%	0%	90%
PPH 4	The park staff promotes meetings and social activities (lunches, dinners, games and other recreational activities) between entrepreneurs and staff of resident companies and the park.	16	80%	7,3 8	6%	19%	75%
PPH 6	The park staff is constantly monitoring and identifying the needs of resident companies.	19	95%	7,0 0	11%	32%	58%
PDH 1	The park has at least one person dedicated to understanding the needs of entrepreneurs and tenant companies.	8	40%	7,0 0	0%	13%	88%
PPH 3	The park staff provides advice to resident companies in funding procurement.	15	75%	6,6 7	20%	20%	60%
PPH 5	The park periodically evaluates the quality and relevance of the services offered directly and the services of the contracted advisers.	19	95%	6,5 8	21%	21%	58%
PDH 5	The park periodically collects and monitors information on its local impact in terms of innovation, business and employment generation, and financial results of resident companies.	20	100%	6,3 0	20%	30%	50%
PPH 1	The park has counselors in multiple disciplines with sufficient dedication to support resident, incubated and start-up businesses.	20	100%	6,2 0	25%	25%	50%
PDH 3	The park has staff specially dedicated to the incubation of new companies.	12	60%	6,0 8	8%	33%	58%
PPH 2	The park staff provides advice to resident companies in the selection of the management team.	14	70%	6,0 7	14%	57%	29%
R: Number of respondents. %R: Response rate over N=20. P: Average score (1-3): % Responses in this region. (4-6): % Responses in this region. (7-9): % Responses in this region							

Practice PPI3: "The infrastructure of the park is designed to maintain the confidentiality of activities and protect the industrial secrecy and other forms of intellectual property of resident companies"; Within the Facilities Management factor (I), stands out because it has obtained a response rate of 85% and reached 71% of the respondents who qualify it in the area of high impact in the performance of STPs. Details of the other practices of this factor, and that have continued in the analysis, can be found in Table 22.

Table 22: Management practices in the Facilities management factor (I) with higher average scores and response rate over 30% in the second round

Code	Practice	R	%R	P	(1-3)	(4-6)	(7-9)
PPI3	The infrastructure of the park is designed to maintain the confidentiality of activities and to protect the industrial secrecy and other forms of intellectual property of resident companies.	1 7	85 %	7,4 7	6%	24%	71%
PDI1	The park staff provides preferential support to initiatives that conduct to the acquisition of equipment and infrastructure that are presented by resident companies.	1 8	90 %	7,0 6	0%	39%	61%
PPI4	The park periodically evaluates if the amount and the spatial distribution of the infrastructure offered is adequate for the needs of resident companies.	1 9	95 %	7,0 0	16 %	21%	63%
PPI5	The park periodically evaluates if the internet/telecommunications	1 6	80 %	6,6 3	19 %	31%	50%

	infrastructure offered is adequate for the needs of resident companies.						
PPI1	The physical distribution within the park, contemplates that the companies of the same industry or technological sector must be located together in a specific area of the park.	1 6	80 %	6,3 8	19 %	38%	44%
PPI2	The physical distribution within the park, contemplates that companies in the same industry or technology sector must be as far away as possible.	1 0	50 %	5,7 0	20 %	40%	40%
R: Number of respondents. %R: Response rate over N=20. P: Average score							
(1-3): % Responses in this region. (4-6): % Responses in this region. (7-9): % Responses in this region							

Table 23 shows the practices in Personnel and organizational structure factor (P) with higher average scores and a response rate higher than 30% in the second round. This factor highlights three practices that obtained a 90% response rate: PDP4, "The park staff is qualified to support the specific needs of resident companies"; PDP3, "Park staff strives to maintain strong links with universities, industry guilds and local governments/administrations"; And PPP2, "The organizational structure and staff of the park are established in a flexible manner according to the needs of resident companies." The first of these practices (PDP4) also reached a relative agreement of 72% of respondents in the high-impact area in the overall performance of STPs.

Third round

As a result of the second round, ten of the practices proposed by the author were excluded. The 25 proposals made by the respondents had overcome the minimum response rate needed to pass to the third round (30%). For this reason, in the third round a total of 82 practices were analyzed by the 14 respondents (see Table 24).

In this round, the respondents qualified again the practices using the same scale of the second round. However, on this occasion we were aware of the results of the second round. With the information received, the respondents had the opportunity to reconsider their qualifications, maintaining anonymity and thus respecting the positive characteristics of Delphi, described by Landeta and Barrutia (2011). In this third phase, there was a response rate of 29.79% if it is calculated on the applications sent and 16.87% if it is calculated on the invitations sent. On the basis of the invitations sent a margin of error of 24.03% (CL: 95%), which would decrease by 22.18% (CL: 95%), individuals who confirmed their interest in participating in the study. The result of this third round was a list of management practices implemented in STPs, grouped into the six factors studied and ranked according to the scores obtained.

Table 23: Management practices in the Personnel and organizational structure factor (P) with higher average scores and response rate over 30% in the second round

Code	Practice	R	%R	P	(1-3)	(4-6)	(7-9)
PDP4	The park staff is qualified to support the specific needs of resident companies	18	90 %	7,5 6	6%	22%	72%
PDP3	Park staff strive to maintain strong links with universities, industry guilds and local governments/administrations.	18	90 %	7,1 7	17%	17%	67%

PPP2	The organizational structure and staff of the park are established in a flexible manner according to the needs of resident companies.	18	90 %	6,1 7	28%	22%	50%
PPP10 .5	The person responsible for understanding and knowledge of the hosted firm is chosen for having professional experience in technology management.	7	35 %	4,1 4	0%	100%	0%
PDP2	The park has a formal organizational structure dedicated to administrative tasks.	11	55 %	3,9 1	36%	64%	0%
PPP10 .7	The person in charge of the understanding and knowledge of the hosted firm is chosen for having professional experience in commercial management (sales).	9	45 %	3,4 4	56%	44%	0%
PPP8. 5	The person in charge of the management of the links with universities is chosen for having higher education training in technology management.	8	40 %	3,3 8	50%	50%	0%
PPP7. 5	The person in charge of the management of the links with universities is chosen for having higher education training in technology management.	8	40 %	3,3 8	50%	50%	0%
PPP11 .5	The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having higher education training in technology management.	14	70 %	3,2 9	50%	50%	0%
PPP11 .2	The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having higher education training in management.	17	85 %	3,2 4	53%	47%	0%
PPP5	The park has at least one person dedicated to managing facilities for entrepreneurs and resident companies.	13	65 %	3,2 3	54%	46%	0%
PDP1	The park has at least one person dedicated to administrative tasks.	15	75 %	3,2 0	67%	33%	0%
PPP1	The park staff is chosen to support the specific needs of resident companies.	16	80 %	3,1 9	56%	44%	0%
PPP4	The park has a formal organizational structure dedicated to making efforts to understand and know the needs of the hosted firms.	11	55 %	3,1 8	55%	45%	0%
PPP3	The park has at least one person dedicated to make arrangements to understand and know the needs of the firms hosted.	13	65 %	3,1 5	54%	46%	0%
PPP12 .5	The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having professional experience in technology management.	17	85 %	3,1 2	59%	41%	0%
PPP12 .2	The person in charge of the management of the facilities for the entrepreneurs and the resident companies is chosen for having professional experience in management.	19	95 %	3,1 1	58%	42%	0%
PPP6	The park has a formal organizational structure dedicated to managing facilities for entrepreneurs and resident companies.	10	50 %	3,1 0	60%	40%	0%
PPP7. 2	The person in charge of the management of the links with universities is chosen for having higher education training in management.	9	45 %	3,0 0	67%	33%	0%
PPP10 .3	The person in charge of the understanding and knowledge of the hosted firm is chosen for having professional experience in finance.	9	45 %	3,0 0	78%	22%	0%
PPP9. 2	The person in charge of the understanding and knowledge of the hosted firm is chosen for having higher education training in management.	8	40 %	3,0 0	75%	25%	0%
PPP8. 4	The person in charge of managing the links with universities is chosen for having higher education training in research.	8	40 %	3,0 0	75%	25%	0%
PPP10 .2	The person in charge of the understanding and knowledge of the hosted firm is chosen for having professional experience in management.	8	40 %	3,0 0	75%	25%	0%
PPP10 .6	The person in charge of the understanding and knowledge of the hosted firm is chosen for having professional accounting experience.	10	50 %	2,9 0	100 %	0%	0%
PPP9. 3	The person in charge of understanding and knowledge of the hosted firm is chosen for having higher education training in finance.	9	45 %	2,8 9	78%	22%	0%
PPP8. 2	The person in charge of the management of the links with universities is chosen for having higher education training in management.	9	45 %	2,8 9	78%	22%	0%
PPP7. 4	The person in charge of managing the links with universities is chosen for having higher education training in research.	7	35 %	2,8 6	71%	29%	0%
R: Number of respondents. %R: Response rate over N=20. P: Average score							
(1-3): % Responses in this region. (4-6): % Responses in this region. (7-9): % Responses in this region							

The most important results can be seen in Table 25. There are eight practices that obtained average scores close to or above 7 points (minimum score of the region established in the instrument as having a high effect on the overall performance of the STP. Here, PDL2 can be highlighted: "The director of the park is chosen for having Training and experience in engineering", which reached an average rating of 6.93 with a level of agreement of 79% of respondents, PPH7 and PPI3 can be highlighted too, PPH7: "The park has at least one well-established company with high capacities and needs in innovation, technology, knowledge and employment, and PPI3: "The infrastructure of the park is designed to maintain the confidentiality of activities and protect the industrial secrecy and other forms of intellectual property of resident companies", both achieved the highest qualification of this group (7.43) with an agreement of the respondents of 71%.

Table 24: Summary of the management practices analyzed in the third round

Management practices proposed by the participants in the Delphi study.		25	30%
L	Leadership	4	5%
E	Strategy	4	5%
V	Links with universities	4	5%
H	Understanding of the hosted company	5	6%
I	Facilities management	1	1%
P	Personnel and organizational structure	4	5%
Practices proposed by the author based on the review of the literature		57	70%
L	Leadership	17	21%
E	Strategy	3	4%
V	Links with universities	2	2%
H	Understanding of the hosted company	7	9%
I	Facilities management	5	6%
P	Personnel and organizational structure	23	28%
Total of practices analyzed in the second round		82	100%

Respondents reached an agreement above 71%, with a moderate effect on the overall performance of STPs, to the practices listed in Table 26. From this group stands out PPH2: "The park staff provides advice to resident companies in the selection of their management team", which concentrated 86% of the respondents in the ratings of the moderate effect area and thus obtained an average rating of 5.50.

Table 25: Results of the third round. Management practices with an agreement level over 70% of the respondents in the region of high effect in the general performance of the STP

Code	Practice	P	(1-3)	(4-6)	(7-9)
PDL2	The director of the park is chosen for having training and experience in engineering	6,93	0%	21%	79%
PDL3	The director of the park comes from the private sector and has experience in management positions of guilds or large companies.	7,21	0%	29%	71%
PDH4	The infrastructure of the park is designed to promote the free circulation of knowledge and open innovation among	7,36	0%	29%	71%

	resident companies.				
PDH2	The park has a formal organizational structure dedicated to understanding the needs of entrepreneurs and tenant companies.	7,0 7	0%	29 %	71%
PPH7	The park has at least one well-established company with high capacities and needs in innovation, technology, knowledge and employment.	7,4 3	0%	29 %	71%
PDE4	The park does not restrict the industrial sectors or the economic activities that the resident companies develop.	7,0 7	0%	29 %	71%
PPI3	The infrastructure of the park is designed to maintain the confidentiality of activities and protect the industrial secrecy and other forms of intellectual property of resident companies.	7,4 3	0%	29 %	71%
PDH1	The park has at least one person dedicated to understanding the needs of entrepreneurs and tenant companies.	6,5 7	0%	29 %	71%
P: Average score (1-3): % responses in this region. (4-6): % responses in this region. (7-9): % responses in this region.					

Table 26: Results of the third round. Management practices with an agreement level over 70% of the respondents in the region of moderate effect in the general performance of the STP

Code	Practice	P	(1-3)	(4-6)	(7-9)
PDE7	The park has a board of directors that, although it has the participation of the government/local administrations and universities, is completely autonomous in its decisions.	5,3 6	0%	71 %	29 %
PDV2	The most productive scientists of the partner university (s) are installed in the park.	5,2 9	0%	79 %	21 %
PPH2	The park staff provides advice to resident companies in the selection of their management team	5,5 0	0%	86 %	14 %
P: Average score (1-3): % responses in this region. (4-6): % responses in this region. (7-9): % responses in this region.					

Practices where a level of agreement higher than 70% was found and with qualifications that were in the area of low effect on the overall performance of the STP, are reported in Table 27. Here, there are highlighted two practices that reached a level of agreement of 100%: PPP10.6: "The person in charge of the understanding and knowledge of the hosted firm is chosen for having professional experience in accounting"; And PPP7.4: "The person in charge of managing links with universities is chosen for having higher education training in research". Another practice to emphasize, given that a level of agreement of 93% was obtained, is PPP8.4: "The person in charge of the managing the links with universities is chosen for having higher education training in research".

Table 27: Results of the third round. Management practices with an agreement level over 70% of the respondents in the region of low effect in the general performance of the STP

Code	Practice	P	(1-3)	(4-6)	(7-9)
PPP10.7	The person in charge of the understanding and knowledge of the hosted firm is chosen for having professional experience in commercial management (sales).	3,2 1	71 %	29%	0%
PPP10.2	The person in charge of the understanding and knowledge of the hosted signature is chosen for having professional experience in management	3,0 0	71 %	29%	0%
PPP4	The park has a formal organizational structure dedicated to making efforts to understand and know the needs of the hosted firms.	3,0 0	71 %	29%	0%
PPP5	The park has at least one person dedicated to managing facilities for entrepreneurs and resident companies	3,0 0	71 %	29%	0%
PPP3	The park has at least one person dedicated to make arrangements to understand and know the needs of the hosted firms.	2,9 3	71 %	29%	0%
PPV1	Establish incentives for the most productive scientists of the local university so they locate themselves in the park to commercialize their research.	2,9 3	71 %	29%	0%
PDP1	The park has at least one person dedicated to administrative tasks.	2,8 6	71 %	29%	0%
PPE1	The park was created by a very small base of founders (maximum two)	2,8 6	71 %	29%	0%
PPL1	The park director is chosen because he has previous experience in management positions in the industry.	2,7 9	71 %	29%	0%
PPV2	The park has at least one person dedicated to managing and promoting the links of tenant companies with universities.	2,7 9	71 %	29%	0%
PPL5.1	The director of the park is chosen for having higher education training in marketing.	2,7 1	71 %	29%	0%
PPL5.5	The director of the park is chosen for having higher education training in technology management.	2,7 1	71 %	29%	0%
PPL6.1	The director of the park is chosen for having professional marketing experience.	2,7 1	71 %	29%	0%
PPL6.5	The director of the park is chosen for having professional experience in technology management.	2,7 1	71 %	29%	0%
PPP10.3	The person in charge of the understanding and knowledge of the hosted firm is chosen for having professional experience in finance.	2,9 3	79 %	21%	0%
PPP8.5	The person in charge of the management of the links with universities is chosen for having higher education training in technology management.	2,9 3	79 %	21%	0%
PPP6	The park has a formal organizational structure dedicated to managing facilities for entrepreneurs and resident companies.	2,8 6	79 %	21%	0%
PPE8	The park admits residents belonging to a broad base (many) of industrial or technological sectors.	21% 0%		2,71	79%
PPP9.2	The person in charge of the understanding and knowledge of the hosted firm is chosen for having higher education training in management.	14% 0%		2,86	86%
PPP7.2	The person in charge of the management of the links with universities is chosen for having higher education training in management	14% 0%		2,79	86%
PPE2	The park was created by a wide base of founders (more than two).	2,71	86%	14%	0%
PPL5.4	The director of the park is chosen for having higher education training in research.	14%		2,57	86%
PPL6.4	The director of the park is chosen for having professional experience in research.	14%		2,57	86%
PPP8.2	The person in charge of the management of the links with universities is chosen for having higher education training in management.	14% 0%		2,57	86%
PPP9.3	The person in charge of the understanding and knowledge of the hosted firm is chosen for having higher education training in finance	14% 0%		2,57	86%
PPP8.4	The person in charge of managing the links with universities is chosen for having higher education training in research.	7% 0%		2,79	93%
PPP10.6	The person in charge of the understanding and knowledge of the hosted firm is chosen for having professional accounting experience.	100% 0%	0%	2,71	

PPP7.4	The person in charge of managing the links with universities is chosen for having 100% higher education training in research.	2,36	0%	0%
P: Average score				
(1-3): % responses in this region. (4-6): % responses in this region. (7-9): % responses in this region.				

DISCUSSION

The results of this study suggest that, according to the relative consensus achieved in the three Delphi rounds, of the 125 statements identified as management practices through literature and the qualified perception of STP directors and managers, there are 82 whose execution has been verified, as well as its effect on the overall performance of STPs. In a set of 28 practices, it has been identified that they are executed in most STPs and on which a relative consensus has been reached that has a low effect on the performance of the STP (see Table 27). It is worth wondering, why is it executed? And, what would happen if they stop running? When reviewing the detail of these 28 items, it is found that 23 of them refer to aspects related to the training and experience of the staff and to the existence of some organizational structures. Apparently, such practices are necessary for the normal functioning of a park but would not trigger extraordinary results. Due to the above, it is proposed to call them "Common and Necessary Practices".

Within the set of eight practices that reached the consensus of high effect on the performance, a classification can be proposed: practices PDL2: "The park manager is chosen for having training and experience in engineering"; And PDL3: "The director of the park comes from the private sector and has experience in management positions of guilds or large companies"; could be classified as "Complementary Practices" because the simultaneous execution of them, apparently would not compromise the individual effect of each one, but, on the contrary, could generate a synergy.

In the same condition, as "Complementary Practices" would be PDH1: "The park has at least one person dedicated to understanding the needs of entrepreneurs and tenant companies" and PDH2: "The park has a formal organizational structure dedicated to understanding the needs of entrepreneurs and tenant companies".

On the other hand, the PDH4 practices: "The infrastructure of the park is designed to promote the free circulation of knowledge and open innovation among resident companies", and PPI3: "The infrastructure of the park is designed to maintain the confidentiality of activities and protect the industrial secrecy and other forms of intellectual property of resident companies "; could be classified as "Opposite practices", this because conceptually they are completely different, that is, at the opposite side. Another possible example of such practices would be the PPE1, PPE2 practices; PPE1: "The park was created by a reduced base of founders (maximum two)" while PPE2: refers to "The park was created by a broad base of founders (more than two)"; which are unequivocally conceptually

opposed. In Table 28 it can be observed pairs of practices that, according to the author's proposal, can be considered as opposing or complementary.

Table 28: Set of pairs of opposite and complementary practices

ID	P	Opposite practices			Agreement	ID	P	Complementary practices			Agreement
		Agreement	ID	P				Agreement	ID	P	
PDH4	7,3 6	71 %	PPI3	7,4 3	71%	PDL2	6,9 3	79%	PDL3	7,2 1	71%
PPE1	2,8 6	71 %	PPE2	2,7 1	86%	PDH1	6,5 7	71%	PDH2	7,0 7	71%
PDE7	5,3 6	71 %	PDE	4,5 7	50%	PPH7	7,4 3	71%	PDE4	7,0 7	71%
PDE2	5,4 3	57 %	PDE	5,2 9	57%	PDP1	2,8 6	71%	PDP2	3,3 6	57%
PDE4	7,0 7	71 %	PDE	6,0 7	50%	PPH2	5,5 0	86%	PPH3	6,1 4	36%

CONCLUSION

The purpose of this paper was to describe and evaluate the effect of management practices applied in six factors, which, according to the literature, influence the performance of STPs.

The most important result of this chapter is the identification of a total of 39 practices, on which the respondents have reached a level of agreement of more than 70%, from their perception of the effect they have on the performance of the STP. In the low-effect category, there was an agreement for a total of 28 practices (see Table 27); for a total of three practices there was agreement among respondents for a moderate effect (see Table 26); and, with a high-performance effect, respondents agreed to eight practices (see Table 25).

THEORETICAL AND METHODOLOGICAL CONTRIBUTION

The present paper contributes theoretically and methodologically to the literature on the management of STPs by testing the utility of the Delphi method in the identification and perceived valuation of the management practices executed in STPs. This work also makes a theoretical contribution through a literature review related to the processes and activities developed in STPs and taking advantage of the experience and knowledge of its directors and managers. Through the Delphi tool, it develops a detailed list of practices Implemented in STPs. Although many of the practices identified can be found in the literature, all of them have been subjected to a rigorous process, seeking the consensus of the participants. Theoretically also contributes with the proposal of a classification of the practices executed in STPs: Common and necessary practices, complementary practices, and opposite practices.

MANAGERIAL IMPLICATIONS

The objective of carrying out the present study was to obtain information to support decision making regarding what kind of management practices to implement to achieve a positive effect on the overall performance of a STP.

The identification and documentation of the 125 management practices analyzed in this study serve as a reference for the authorities responsible for the development of science, technology and innovation, specifically for policies to promote STPs and other similar policy instruments (e.g. Incubators And business accelerators). The results are also useful for managers and promoters of new STPs or initiatives with similar objectives. Understanding the processes and activities that take place in STPs in different parts of the world will allow managers to make a comparative assessment of the relevance of the activities and processes that are being developed, allowing them to establish if they are adequately achieving its mission or whether it is necessary to include new elements, or redirect existing ones. Meanwhile, managers of new initiatives have at their disposal a set of practices to consider when designing their own value creation model, structure and business units, definition of functions, and definition of its strategic direction, among others.

LIMITATIONS AND FUTURE INVESTIGATIONS

The main limitations of this study were the number of cases considered, and that the STPs studied were at different levels of development. Future studies should expand the number of parks surveyed and control variables such as the age of the STP or establish criteria to determine at what stage of development each STP is. It is also believed that future research should include a quantitative approach to compare the effects of each practice on innovation and economic performance indicators. Given the difficulty that can be had in carrying out the statistical analysis of the relation of the practices with the results of the parks and as a confirmatory method of the validity of the results, although it was not foreseen, it is considered necessary the evaluation of some metrics and the formulation of some hypothesis based on the findings in the literature and identified practices. Due to the fact, that, by the scope of this study were not analyze indicators of the performance of the STPs consulted, it is considered necessary to contrast these "Common and Necessary Practices" within a larger sample of STPs and with a quantitative approach. It is difficult to determine if respondents' attrition has any effect compared to other studies since it is not common in Delphi studies to report data in this regard (Boulkedid et al., 2011). Another limitation is that the respondents come from different parts of the world and the specific cultural characteristics by geographic regions were not taken into account. Future research should explore these features in detail.

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